

## Portable Sampling Lance

### *Introduction*

The present invention generally relates to a portable sampling lance for rapid and non-destructive sampling of unpacked bulk food and the like.

The sampling of large and unpacked food shipments is normally performed according to legislative set sampling plans. Since the contaminants are usually  
5 not evenly distributed in the shipment, the distribution of the contaminant is a crucial parameter that is taken into account by sampling several subsamples and analysing them with the intention to obtain a realistic average contamination with a certain statistical security.

However, the sampling and the subsampling are labour intensive and not very  
10 practical.

An alternative to the above is the sampling of bulk size food loads. In US 5,942,669, bulk products or palletised products are loaded en masse into an airtight chamber and subjected to physical agitation, f.ex. vibration, blasts of pressurised air into the chamber, jets of pressurised air directed at the products,  
15 and cycles of pressurisation and depressurisation, to release both vapours and particulates from both the interiors and the outer surfaces of the cargo items. The object of this physical agitation is to knock loose aerosol-size contaminant particles on the exterior and interior surfaces of the items, and to encourage the vaporisation of low vapour pressure chemical residues into the air in the  
20 chamber. In this manner, contaminant particulates from the outer surfaces of the items and from the interiors of the items are placed in suspension in the air in the chamber, and contaminant vapours from the outer surfaces of the items and from the interiors of the items are mixed with the air in the chamber. During the depressurisation phases, air withdrawn from the chamber is passed through  
25 a collection system to collect the vapours and particulates. The collected vapours and particulates then are transferred to conventional analytic instruments for identification. If a targeted substance such as a pesticide residue, a

trace of an explosive, or a trace of an illegal drug, is identified during this analysis, appropriate steps may be taken, including generating an audible and visible alarm.

5 A problem with this type of sampling is that the apparatus is not transportable and the samples have to be taken to the apparatus.

### ***Object of the invention***

The object of the present invention is to provide a portable system for sampling large, unpacked shipments of foods and the like.

### ***General description of the invention***

10 In order to overcome the above mentioned problem, the present invention provides a portable sampling lance for rapid and non-destructive sampling of unpacked bulk food and the like comprising:

a head portion with a chamber, said chamber having an intake opening covered by a grid,

a duct connected to said head portion,

a collecting device connected to said duct ,

15 a suction device connected to said duct,

wherein said head portion has a front end and a rear end and wherein the intake opening of the chamber is oriented towards the rear end of the head portion.

20 The portable lance is dug into a heap of bulk food such as corn, rice etc. Since the opening of the chamber is oriented towards the rear end of the head portion and since the opening is covered by a grid, only small particles like dust and rub off material are admitted into the chamber whereas the larger particles like the corn or rice grains are retained outside said chamber. The dust and rub off material particles are sucked from the chamber through the duct and are  
25 collected by the collecting device.

The fact that the opening of the chamber is turned the opposite way as the movement used to dig or push the lance into the mass of product to be analysed, protects the grid from mechanical constraints. Furthermore, the grid does not easily become clogged during the introduction of the portable lance into the product to be sampled.

The mesh of the grid is adapted to the product to be sampled and is chosen so that the particles or individual grains of the food are retained outside the chamber. The grid has preferably a mesh size of 0.2 mm to 3 mm depending on the type and the hardness of material to be analysed.

10 The head portion may be substantially spearhead or hook shaped.

According to a preferred embodiment, the head portion further comprises vibrating means. These vibrating means allow the portable lance to be introduced into the product more easily. Furthermore, they enhance the quantity of rub-off and dust collected in a certain periods of time.

15 Preferably, the collection device is a filter means such as a round filter made of glass fibre, cellulose, nylon etc or an electrostatic device

According to another preferred embodiment, the chamber has a substantially conical shape, the part comprising the intake opening being larger in diameter than the part connected to the suction duct so the dust and rub off material are accelerated once they penetrate into the chamber.

In order to further enhance the uptake of dust and rub off material, the grid may be charged electrically. In that case the grid must be insulated from the chamber and the counter-electrode can be placed inside the chamber.

#### ***Detailed description with respect to the figures***

The present invention will be more apparent from the following description of not limiting embodiments with reference to the attached drawings, wherein

Fig.1: shows a schematic representation of a first embodiment of the head portion of the portable lance;

Fig.2: shows a schematic representation of a second embodiment of the head portion of the portable lance;

Fig.3: shows a schematic representation of an embodiment of a collecting device of the portable lance;

5 Referring now to the drawing, reference numeral 10 in FIGS. 1 and 2 identifies the head portion of a portable lance.

The portable sampling lance further comprises a duct 12 connecting the head portion to a collecting device. The portable lance is connected to a suction device supplying a reduced pressure to the head portion 10 and the chamber  
10 14 of the lance.

The head portion 10 has a front end 14 and a rear end 16 and a chamber 18 located inside the head portion. The intake opening 20 of the chamber 18 is oriented towards the rear end 16 of the head portion 10 i.e. the intake opening 20 faces rearwardly when the lance is introduced into the sample to be analysed.  
15 The intake opening 20 is covered by a grid 22 so that only grains, which are smaller than the perforations of the grid, pass through the grid into the chamber 18. The grains, which are larger in diameter than the perforations in the grid 22, will remain outside of the chamber 18. Since the intake opening 20 is turned rearwardly, the grid 22 will not become easily clogged by grains of a grain size larger than the perforations in the grid. Furthermore, the grid 22 is  
20 submitted to less mechanical constraints during the introduction of the lance into the material to be analysed.

Once the head portion 10 of the lance is introduced into a heap of bulk material, the dust and rub off material is sucked into the intake opening 20 of the head portion 10, by virtue of the reduced pressure produced therein by a suction  
25 blower or the like (not shown). The dust and rub off material, which is sucked into the intake opening 20 of the head portion 10, passes through the grid 22 into the chamber 18, the interior of which is defined by a conical wall structure. At its bottom, the chamber is provided with an opening 24 connecting the  
30 chamber 18 to the duct 12.

As indicated above, the fact that the intake opening 20 faces generally backwardly, i.e. towards the rear end 16 of the head portion 10 means that no material can pass into the chamber 18, without having been drawn therein by a suction effect. In that respect, by suitably adjusting the reduced pressure generated by the suction device and/or by virtue of a suitable choice of the cross-section of the suction intake opening of the duct 12, it is possible to define the range of grain sizes which is to be drawn into the duct through the intake opening 20 of the chamber 18.

The head portion 10 of the lance which may be for example from 100 mm to 300 mm in diameter and have a length of 100 mm to 400 mm, is connected by way of suitable conduits to a means for producing a reduced pressure as indicated in the form of a suction blower, which is operable to produce a reduced pressure that is applied to the intake opening of the chamber.

The above-described structure and mode of operation ensure that the fine-grain material which is sucked into the chamber 18 is representative of the portion of the bulk material from which the sucked-in material is drawn.

Mounted to the head portion 10 of the portable lance is a vibrator, which is not illustrated, in order not to encumber the drawing. The configuration and arrangement of the vibrator and the appropriate connections thereto will be familiar to any man skilled in the art. The vibrator makes it easier to introduce the lance into the bulk material to be analysed. Furthermore, grains being too large to pass the grid 22 on the intake opening can be removed by actuating the vibrator at certain intervals of time. The resulting vibrational effect causes at least a large part of the grains clinging to the outside surface of the grid 22 to drop off. It is also possible for the vibrator to be operated in a continuous mode of operation in order to assist with the passage of the dust and rub off material through the grid of the intake opening and also through the layer of grains which is possibly clinging to the outside of the latter. In that mode of operation however, the vibrator would only produce a light vibration so that the material which is sucked into the arrangement by the suction force produced by the suction

device is held to the outside surface of the grid and the vibration effect accelerates the passage of the dust and rub off material through the grid.

The dust and rub off material and other fine-grain material, which is drawn into the intake opening 20, first passes into the chamber 18 and then through the duct 12 into to the collecting device 26 under the effect of the reduced pressure generated by the suction device. The fine grain material is then collected by the collecting device 26, which is f. ex. a filter 28 or an electrostatic device. The time at which the filter 28 is to be removed for analysis can be established by measuring the reduced pressure downstream of the collecting device, in the direction of flow of the air through the arrangement. A rise in the reduced pressure at the downstream location as mentioned indicates that the filter 28 is clogged to a greater or lesser degree.

The collecting device 26 may also be in the form of a cyclone separator is connected into the circuit between the head portion 10 of the lance and the suction device.

The collected fine grain material is analysed according to conventional analytical methods.

It will be seen from the foregoing that the method and apparatus for taking samples from a bulk material may be applied to any suitable material such as corn, barley, wheat, rice, rye, coffee beans, soy beans, nuts (with and without shells), dried chilli peppers or other 'non ground' food products, for subsequently determining respective chemical contaminants contained in the sampled material.

It will be further appreciated that the above-described method and apparatus according to the invention have been described solely by way of example and illustration thereof and that various modifications and alterations may be made therein without thereby departing from the scope of the invention.

#### **Reference list**

10 head portion

12 duct

14 front end

16 rear end

18 chamber

5 20 intake opening

22 grid

24 opening

26 collecting device

28 filter